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Teacher-Students Relationships in First and Second Grade Classrooms. Adaptation of the Questionnaire on Teacher Interaction-Early Primary (QTI-EP)

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Abstract

The aim of this study is twofold: to adapt, for a Spanish population, the Questionnaire on Teacher Interaction-Early Primary (QTI-EP), an instrument developed in 2013 by Zijlstra, Wubbels, Brekelmans, and Koomen to measure the perceptions of 6- to 9-year-old children on teacher-students relationships; and to analyze the influence of these perceptions on academic achievement. The QTI-EP has been demonstrated to have a dual factor structure —the dimensions of teacher proximity and teacher control— an acceptable reliability, and predictive validity on academic achievement. The QTI-EP is sensitive to children's differential responses so that the scores of students from the same classroom are more similar to each other than to the scores of students from different classrooms. The dimension of proximity predicts both the mathematics mark and the combined mark. The dimension of control moderates the relationship between proximity and academic achievement.

Keywords: Teacher-students relationships, classroom environment, early primary education, academic achievement, teacher control.

Resumen

La meta del estudio es doble, adaptar al castellano el *Questionnaire on Teacher Interaction-Early Primary* (QTI-EP), un instrumento desarrollado en 2013 por Zijlstra, Wubbels, Brekelmans y Koomen para medir las percepciones que los niños de 6 a 9 años tienen de las relaciones entre el profesor y los alumnos, y analizar su influencia en el rendimiento académico. El QTI-EP ha probado tener una estructura factorial dual, dimensiones proximidad y control del profesor, una fiabilidad aceptable, y validez predictiva sobre el rendimiento académico. El QTI-EP resulta sensible a las respuestas diferenciales de los niños de forma que las puntuaciones de los alumnos de una clase son más similares entre sí que las puntuaciones entre alumnos de diferentes aulas. La dimensión proximidad predice tanto las calificaciones en matemáticas como la calificación compuesta. La dimensión control modera las relaciones entre proximidad y rendimiento.

Palabras clave: Relaciones profesor-alumnos, clima social de aula, ciclo inicial de educación primaria, rendimiento académico, control del profesor.

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Introduction

There is a large body of evidence for the impact of teacher-student relationships (henceforth T-S) on students' school outcomes (Cornelius-White, 2007; Roorda, Koomen, Spilt, & Oort, 2011) and it is widely accepted that the quality of T-S relationships implies an improved response to children's development needs (Buyse, Verschueren, Doumen, van Damme, & Maes, 2008).

Most studies on T-S relationships are based either on attachment theory, according to which the teacher is a figure with whom the child can establish a significant bond (Pianta, Hamre, & Stuhlman, 2003), or on social motivation theory (Skinner, Wellborn, & Connell, 1990), which holds that the teacher's function is to respond to the students' basic needs of belonging, competence and autonomy. Both theoretical approaches focus on the affective and motivational behaviors involved in the dyadic relationship between the teacher and each student, and in general, the teacher is the person who usually reports on this relationship.

A complementary approach to the aforementioned theories is the interpersonal perspective, which posits that the T-S relationship involves a process of dynamic interaction in the classroom, in which the teacher's instructional effectiveness is measured in terms of recurrent and relatively stable patterns in the T-S relationships that arise in the classroom (Wubbels, Brekelmans, den Brok, & van Tartwijk, 2006). Scholars within this approach argue that the T-S relationship is the most important variable for managing a classroom (Doyle, 1986). This approach raises the need to consider not only motivational and emotional aspects, but also the teacher's control or guidance behaviors (Vaquer, Carrero, & García Bacete, 2011), and the group or class dynamics (Kyriakides & Creemers, 2008), and it prefers to use the students themselves as informants (Valiente, Lemerey-Chalfant, Swanson, & Reiser, 2008). Research has shown that students' perceptions of the teachers' behavior are strongly linked to their achievement and motivation in all subjects (Brok, Brekelmans, & Wubbels, 2004) and also that healthy T-S relationships are a prerequisite to the involvement of students of a class in learning activities (Brekelmans, Sleegers, & Fraser, 2000).

The present study adopts this interpersonal perspective and is grounded on students' perceptions of how the teacher relates to the group of students in the class as a whole. These perceptions have been shown to be a particularly important aspect of children's learning experiences (Liew, Chen, & Hughes, 2009). Young children are considered to be reliable inform-

ants of what goes on in the classroom and the evidence clearly indicates that their perceptions of the classroom environment differ from those of teachers, and that agreement among pupils is greater than among teachers (Murray, Murray, & Waas 2008). Teachers tend to have a more positive perception of their classes than do their students (Wubbels & Brekelmans, 2005). However, Wubbels, Brekelmans and Hooymayers (1991) reported that as the quality of the T-S relationship increases, the discrepancy between teachers' and students' perceptions declines.

The *Questionnaire on Teacher Interaction* (QTI) operationalizes the interpersonal theory of teaching. The authors of the instrument, Wubbels, Créton and Hooymayers (1985), focus their research on T-S relationships as perceived by students. The strength of this tool is twofold: first, it has a firm theoretical grounding in the systems theory of communication (Watzlawick, Beavin, & Jackson, 1967) and the circumplex model of interpersonal behavior (Leary, 1957); and secondly, it has been validated in many countries and translated into more than 20 languages (Wubbels et al., 2006). Recently, den Brok et al. (2003) completed a transnational validity study comparing student responses to the questionnaire in Singapore, Brunei, USA, Netherlands, Slovakia and Australia, finding satisfactory reliability and validity of the QTI in all these countries. Wubbels et al. (1985) describe the teacher's behavior in terms of two independent dimensions that offer a picture of the teacher's relational patterns with the students. The affiliation or *proximity* dimension concerns affective components and refers to the teacher's supportive behaviors or expression of emotions towards the students. At one extreme are the friendly, helpful and understanding behaviors displayed by the teacher, and at the other extreme, dissatisfaction with and admonition of the students' behavior. The influence or *control* dimension focuses more on instruction, on who controls, steers or manages the communication process, on teacher behaviors designed to guide and provide structure in teaching and behavior. At one extreme are teachers who dominate or exercise control, either by clearly leading the teaching process and the classroom, or by giving students the freedom or autonomy to decide what they can do or how to do it; at the other extreme are teachers who do not exert this positive influence, either by overstating their control by imposing it on students, or because they are insecure or indecisive. Wubbels et al. (2006) demonstrated that these two dimensions almost entirely (around 80%) explain students' characterization of the teacher's interpersonal behavior.

There is ample evidence which indicates that both dimensions are

important for students' learning in secondary (e.g., Sivan & Chan, 2013) and university level education (e.g., Fraser, Aldridge, & Soerjaningsih, 2010) and there are sufficient empirical grounds to confirm the association between students' school achievements and the quality of the teacher-student interaction (Fraser & Walberg, 2005). In these educational contexts, teachers with high levels of control tend to have a positive influence on the academic success of their students (Henderson, 1995). Similar results were found for proximity, in which high levels of proximity sometimes improve performance, while at other times low proximity leads to poorer results. Thus, Henderson (1995) found that the more the students perceived teacher behavior as friendly, understanding and cooperative, the higher their marks would be. Some studies have found that only when teachers' behave oppositionally or distance themselves from the students, and where students perceive that their teacher is dissatisfied and frequently reprimands them, was there an association with poor achievement, but helping behaviors were not associated with high achievement (e.g., Rawnsley, 1997). In addition, the research reveals positive relationships for both dimensions, particularly the proximity dimension, with affective variables (Wubbels et al., 2006), usually measured as attitudes, such as a liking or preference for the subject, the activities, or the teacher (Sivan & Chan, 2013) and motivation to learn, such as the effort one is prepared to make, the relevance given to the subject or the degree of confidence one has to face the learning process (Maulana, Opdenakker, den Brok, & Bosker, 2011; van Amelsvoort, 1999). Broadly speaking, the T-S relationships that produce the most positive student outcomes are characterized by a fairly high degree of proximity and control on the part of the teacher (Wubbels et al., 2006).

The QTI tool has not been so widely applied in primary education. Goh and Fraser (1998) developed a version of the QTI for older primary school pupils, used initially in Singapore (QTI-P), in which both dimensions —proximity and control— are still present. This version has been validated for various populations (e.g., Kokkinos, Charalambous, & Davazoglou, 2009, in Greece). Overall, the results in the higher grades of primary school replicate those obtained in secondary schools. Goh and Fraser (2000) found the highest achievements and best student attitudes in classrooms in which teachers emphasized behaviors of leadership, friendliness, helpfulness and understanding and showed fewer signs of insecurity and dissatisfaction.

Recently, Wubbels and colleagues validated a 20-item in-

strument to be applied with 6- to 9-year-old children (QTI-EP, *Early Primary,* Zijlstra, Wubbels, Brekelmans, & Koomen, 2013). In this study, the *control* dimension explained more variance in mathematics than the *proximity* dimension, and tended to have more influence on the achievement of all children, while *proximity* seemed to be more important in some classrooms than in others.

In light of the above discussion, the aim of the present study is twofold: 1) to adapt, into Spanish, an instrument to measure the perceptions held by children in the first and second grades of primary education about the teacher's relationship with them, allowing the levels of teacher *proximity* and *control* to be measured; and 2) to analyze the influence of the T-S interpersonal dimensions perceived by the students on their academic results. Two performance measures were used as a criterion variable, namely, mathematics mark and a combined measure of performance.

Method

Participants

The sample consisted of 674 students enrolled in 33 classes in the first and second grades of primary education (14 first grade classes and 19 second grade classes) in public schools in urban areas of Castellon, Sevilla and Valladolid, distributed as follows: by geographical area, Castellon, 419 (62.20%); Sevilla, 145 (21.50%) and Valladolid, 110 (16.3%); by gender, 350 girls (52.08%) and 323 boys (47.92%); by primary education grade, 293 first grade (43.62%) and 381 second grade (56.38%). Specifically, participating students evaluated the relationship with their teacher-tutor as this is the teacher with whom they spend most time and carry out most activities.

Instruments

Questionnaire on Teacher Interaction-Early Primary (QTI-EP)

The items in the QTI-EP are descriptive statements of typical classroom experiences and teacher behaviors with the student group in class (e.g., "The teacher is friendly", "The teacher explains things clearly"). They focus on the teacher's *proximity* and *control* behaviors. Each dimension contains 10 items with positive and negative behaviors. Examples of items from the *proximity* dimension are "The teacher acts friendly toward children" and "The teacher gets angry quickly". Examples of items in the *control* dimension are "The teacher explains everything well" and "Children are naughty to the

teacher". The items were adapted from English into Spanish by a process of back-translation with the participation of experts. The questionnaire was personalized by including the name of the class tutor when the researcher administered it to the class.

The children were asked to respond on a 5-point Likert scale ("never occurs", "occurs very little", "occurs sometimes", "occurs very often", "always occurs"). To make easier the interpretation of the results, the scores for each dimension were transformed to a scale of 0 to 1.

Academic achievement

As Roorda et al. (2011) point out, the use of tests, school marks or teachers' assessments as measures of academic achievement can lead to variations in results. In the present study school marks were used, since students' perceptions of T-S relationships have a greater effect on their marks than do objective tests (Roorda et al., 2011). Specifically, two measures were used and applied on a scale of insufficient, sufficient, good, very good and excellent. The first was the student's mark in mathematics at the end of the course. Crosnoe et al. (2010) report that individual differences in mathematical abilities are pronounced when children first start school, and in the early years the teaching of mathematics is highly accumulative and has a strong didactic component. The quality of the T-S interaction therefore appears to be especially important in the case of activities for learning mathematics. The second measure was the average academic achievement, for which a combined mark was used, taking marks for mathematics, Spanish language and knowledge of the environment, all three subjects taught by the class teacher-tutor in all classes. As the study by Zijlstra et al. (2013) used national achievement tests, the use of marks in this study could make it possible to confirm whether the results of the original study were maintained.

Procedure

The present study was carried out in the first and second grades of primary education in ten public schools in Castellon, Sevilla and Valladolid. Mandatory permission was requested from the schools and families to administer the questionnaires. Given the age of the students, 6-8 years, the QTI-EP was administered individually. The researcher read the item aloud and the child indicated his or her response option on a scale. Around six minutes was spent with each child.

At the end of the academic year the schools were asked to provide the students' final evaluation marks. As three schools did not provide these marks, finally 447

students from 21 classes (13 from the second grade and 8 from the first) were included in the regression analysis.

Results

The following analytical strategy was developed to pursue the study aims. First the construct validity of the QTI-EP was analyzed by comparing two confirmatory factor analyses and calculating the average variance extracted. Then a correlation analysis was performed between the two resulting dimensions and between the items of each dimension. Several types of reliability (internal consistency, composite reliability, degree of agreement among informants from the same classroom and differences between classrooms) were then studied. Finally, the association between the dimensions of the QTI-EP and academic achievement (predictive validity) was explored by analyzing the correlations between interpersonal dimensions and criteria and an analysis of hierarchical regression models.

Validity and reliability of the QTI-EP

To explore the construct validity of the QTI-EP, two confirmatory factor analyses (CFA) were performed using the EQS program (Structural Equation Program for Windows, 6.1, Bentler, 1995). According to the model of Wubbels et al. (1983), two interpersonal dimensions, *proximity* and *control*, are expected to underlie the data. To test the hypotheses two models were proposed: a two-factor model *(proximity* and *control)* and a hierarchical two-factor model (in which each of the two dimensions explains the second-order constructs: *friendliness* and *opposition* in the *proximity* dimension, *clarity* and *discipline problems* in the *control* dimension). The significant change in $\chi 2$ was used to compare the two models (Kline, 2005).

The CFA revealed that some of the items did not follow a normal distribution (normalized estimate of Mardia's coefficient of multivariate kurtosis = 50.78, far higher than 3). Robust estimates were therefore used for the fit method (ML-Robust, maximum likelihood estimation with robust estimates). Table 1 shows a summary of the fit indices of the two models. The results indicate that the hierarchical two-factor model fits the data ($\Delta\chi^2_{S\text{-}B}$ (4) = 219.263, $p \leq .001$) better than the two-factor model. As shown in Table 1, the fit indices support the goodness of the hierarchical model ($\chi^2_{S\text{-}B\ (df=130,\ N=674)}$ = 264.318, p = 0.004; $\chi^2_{S\text{-}B}$/ df = 2.03; CFI = .910; IFI = .911; RMSEA = .039, with a 90% confidence interval between .032 and .048). Table 2 reports the 18 items that presented a good fit in the hi-

Table 1

Summary of the Fit Indexes of the Interpersonal Relationships Models Tested with Confirmatory Factor Analysis

	$\chi^2_{S\text{-}B}$	$\chi^2_{S\text{-}B}$/df	CFI	IFI	RMSEA
Two-factor model	483.581	3.61	.766	.768	.062 (90% between .056 and .068)
Hierarchical two-factor model	264.318	2.03	.910	.911	.039 (90% between .032 and .048)

Note. $\chi^2_{S\text{-}B}$ (Satorra-Bentler scaled $\chi 2$), $\chi^2_{S\text{-}B}$/df, Comparative Fit Index (CFI), Bollen Fit Index (IFI) and Root Mean-Square Error of Approximation (RMSEA).

erarchical CFA and their factor loadings.

The average variance extracted, or the average of the variances of the indicators, is .34 for the *proximity* dimension and .27 for the *control* dimension. The range of the standardized factor loadings for the 18 items is between .389 for item 7 and .720 for item 19; all are significant on any of the four second-order factors. In terms of the original questionnaire, two items were removed from the opposition factor because their factor loadings were below .30 ("Ms/Mr X thinks that mistakes are bad" and "Ms/Mr X gets mad if children make mistakes"). The item "Children pay attention to Ms/Mr X" from the *clarity* factor presented the best fit in the *discipline problems* factor, in the reverse sense. This change is consistent with the general meaning of the factor, namely that children disobey or the teacher manages the classroom badly.

According to the theoretical framework, the two interpersonal dimensions should be seen as two independent constructs. To test this assertion the correlation between *proximity* and *control* was examined. The results show that the two dimensions are related *(r* = .53), coinciding with the result of Zijlstra et al. (2013). For discriminant validity, a rule of thumb is that the correlation should be below .70 (Kline, 2005). It can therefore be confirmed that the two dimensions have considerable unique variance and can be studied as two distinct constructs.

The correlations between the items of each dimension were then examined to test for problems of redundancy between them. Goh and Fraser (1998) used this procedure to analyze the psychometric qualities of the QTI. The average of the correlations in the *proximity* dimension is .24 and in the *control* dimension, .19, indicating

Table 2

Hierarchical Confirmatory Factor Analysis. Unstandardized Factor Loadings, Estimation Errors and Standardized Factor Loadings

Parameters	Unstandardized Factor Loadings	Estimation Error	Standardized Factor Loadings
DIMENSION 1: PROXIMITY			
Factor 1: Friendliness	219.772	.092	.681
1. Ms/Mr X is a kind teacher	.807	.101	.562
16. Ms/Mr X is friendly.	.929	.107	.591
19. Ms/Mr X acts friendly toward children	1.000	—	.720
Factor 2: Opposition	1.000	—	–.691
9. Ms/Mr X gets angry.	–.788	.073	–.588
10. Ms/Mr X complains.	–.608	.073	–.447
13. Ms/Mr X nags us.	–.828	.073	–.585
17. Ms/Mr X gets angry quickly.	–.631	.073	–.461
18. Ms/Mr X shouts at us.	1.000	—	–.663
DIMENSION 2: CONTROL			
Factor 3: Clarity	.656	.111	.701
2. Ms/Mr X explains everything well	.557	.115	.435
4. When Ms/Mr X makes a promise s/he also follows through.	1.000	—	.489
6. All children learn a lot from Ms/Mr X.	.674	.115	.482
11. Ms/Mr X explains things clearly.	.774	.133	.533
Factor 4: Discipline problems	1.000	—	–.652
7. We do things that are not allowed in class.	–.542	.067	–.389
8. Children pay attention to Ms/Mr X.	.599	.063	.470
12. When Ms/Mr X tells us to be quiet we take no notice and keep talking.	–.747	.071	–.489
14. Children talk out of turn	–.973	.071	–.625
15. Children are naughty to Ms/Mr X.	1.000	—	–.717
20. Children fool around in class	–.733	.072	–.652

only small overlap between the items.

Internal consistency, construct reliability (composite reliability), the agreement between informants in each dimension and the differences between classes were studied to determine the reliability of the two QTI-EP dimensions. Internal consistency is acceptable in the two dimensions (Cronbach's α = .71 and .70, in *proximity* and *control,* respectively) and composite reliability is good (.80 and .78, in *proximity* and *control,* respectively). With regard to reliability, another desirable feature of a tool to evaluate classroom environment is the degree of agreement among informants, or the extent to which children from the same class have similar perceptions of their teacher, but different from those perceptions students in another class have of their teacher (Lebreton & Senter, 2008). To explore this question, the intraclass correlation coefficient (ICC) was calculated. In the sample, with an average number of 20 students per class, the agreement between students in same class is moderately high for *proximity* (ICC = .13, which equates to a 74% agreement between the pupils in a class) and moderately low for *control* (ICC = .08, equivalent to 63% agreement). Lüdtke, Robitzsch, Trautwein and Kunter (2009) state that ICCs over 30 tend to be infrequent in school environments. A one-factor analysis of variance (ANOVA) was then performed, in which classroom membership was used as the inter-observer fixed factor. The η^2 values obtained were .15 ($p < .000$) for the *proximity* dimension and .13 ($p < .000$) for the *control* dimension, indicating that there are significant differences between classes in both dimensions.

Association between T-S relationship and academic achievement

Table 3 reports the descriptive statistics for the interpersonal dimensions and academic achievement.

The means for *proximity* and *control* are very high, .80 and .81, respectively. The range of scores is relatively narrow: .65 in *proximity* (with 36% of the scores outside the grand mean, ± 1z) and .54 in *control* (28% outside the grand mean). The mean for mathematics and for the combined mark are high, 3.62 and 3.63, respectively. In mathematics, the range is from 1 to 5, with 46.9% of marks outside the grand mean. The range for the combined mark is also between 1 and 5, but only 31.5% of the marks are outside the grand mean.

Correlation analysis and regression analysis were used to study the predictive validity of teachers' interpersonal dimensions for their students' academic achievement.

Table 3

Descriptive Data for Interpersonal Dimensions and Academic Achievement

	Mean	SD	Min.	Max.
Interpersonal Dimensions (N = 674)				
Proximity	.80	.12	.35	1.00
Control	.81	.12	.46	1.00
Achievement (N = 447)				
Mathematics	3.62	1.23	1.00	5.00
Combined mark	3.63	1.11	1.00	5.00

Table 4 reports the Pearson correlations between the interpersonal dimensions and the achievement variables.

All the correlations are positive, but only those for the *proximity* dimension are significant, both for mathematics ($r = .14^{**}$) and for the combined mark ($r = .15^{***}$).

Hierarchical regression analysis was used to test both the individual contribution of each interpersonal dimension to the achievement measures, and their joint contribution. First, possible covariates were included in this association, namely, the students' grade and their gender. The interpersonal dimensions were then introduced, first each one independently, and then jointly. The interaction terms were considered in the final stage.

Given that a large number of complete classes of first and second grades were used (21), that the correlations between the interpersonal dimensions and achievement at the classroom level were higher than those obtained at the student level, and that the ICCs of the interpersonal dimensions were moderate, it was decided to perform regression models with two levels: student level and teacher-classroom level. To test this hypothesis the mathematics ICC and the combined mark ICC were calculated. The ICC for mathematics was .07 and for the combined mark, .08. These results indicated that it was not appropriate to con-

Table 4

Pearson Correlations Between Interpersonal Dimension and Academic Achievement

	Mathematics	Combined mark
Proximity	.14**	.15***
Control	.04	.06

Note. $^{*}p \leq .05$; $^{**}p \leq .01$; $^{***}p \leq .001$; $N = 447$.

tinue with the multilevel analysis, since membership of one class or another had little impact on marks. Stepwise multivariate regression analysis was therefore performed by blocks. Table 5 presents a summary of the regression analysis.

To perform these analyses all the variables were centered: to centre the categorical variables the values –1 and 1 were adopted (gender: boys = –1; girls = 1, grade: first = –1 and second = 1); to centre the continuous variables, the mean was subtracted from the raw score. The two covariates used were not significant by themselves. However, the grade covariate was retained in the predictions for the combined mark, since when combined with the interpersonal variables, they were significant. The range of the Durbin-Watson test lay between 1.966 and 1.961; problems of multicollinearity were therefore ruled out.

The *control* dimension was not a significant predictor in any of the models, indicating that in these age groups the *control* dimension per se does not contribute to explaining individual variations in achievement. The only predictor of mathematics was *proximity* (β = .136; p = .004), whereas in the case of combined mark, achievement was mostly explained by the interaction model ($F_{(4,442)}$ = 4.539, p = .00,

Table 5

Summary of the Regression Models to Predict Academic Achievement According to the Interpersonal Dimensions in Primary Education First and Second Grade Classes

	Covariance Model		Proximity Model		Control Model		Composite Model		Interaction Model	
	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Mathematics			.019**		.002		.020		.022	
Proximity				.136**		—		.155**		.142*
Control				—		.043		–.036		–.048
Int_ProxControl										–.057
Combined mark	.007		.031***		.013		.031		.039*	
Grade		.086		.092*		.098*		.092		.101*
Proximity				.154**		—		.155**		.132*
Control				—		.078		–.002		–.021
Int_ProxControl										–.099*

Note. *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$; N = 447. For the significance of R^2, that of the ΔR^2 was taken from the previous model with the highest R^2.

R^2 = .039), which included *grade* (β = .101; p = .034), *proximity* (β = .132; p = .017), *control* (β = –.021; p = .712) and the *proximity*control* interaction (β = –.099; p = .050).

To investigate the significance of the interaction the procedure proposed by Holmbeck (2002) was followed. Three groups of students were formed according to their perception of their teacher's *control*: high (with a score above 1 standard deviation, SD), medium (between ± 1SD) and low (below –1SD). Three regression analyses were then performed separately for each of the groups (see Figure 1).

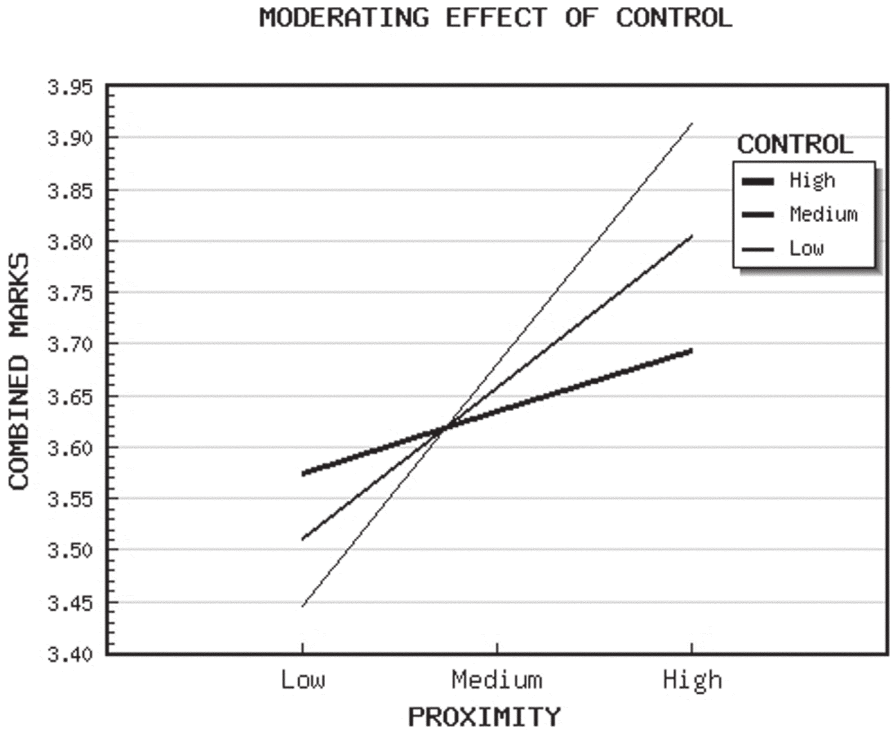

Figure 1. Moderating effect of the control dimension on the prediction of combined marks by the proximity dimension.

To determine whether there were differences between the slopes of the three groups, that is, whether the association between combined mark and *proximity* varied according to the level of perceived control, post-hoc tests were performed using Jose's *ModGraph* program (2013). The results indicated that low ($t_{(444)} = 3.44$, $p < .001$) and medium ($t_{(444)} = 2.38$, $p = .02$) levels of *control* moderated the relationship between *proximity* and combined mark, but this was not the case for high levels of *control*. The favorable effect of *proximity* on the combined mark decreased, the greater the perception of *control*; the combination of low *control* and high *proximity* therefore produced the best achievement.

Discussion

The present study adapted the version of the QTI questionnaire for early primary education to the Spanish context. This questionnaire measures perceptions of the classroom environment, understood as the relationship between the teacher and the students, from an interpersonal perspective (QTI-EP, Zijlstra et al., 2013). The influence of the teacher's interpersonal patterns, as perceived by students, on academic achievement was also analyzed.

The Spanish questionnaire retains the same factor structure as the original, its reliability indices are acceptable, and it provides some evidence of its predictive validity for achievement. Following confirmatory factor analysis, the number of items in the questionnaire was reduced from 20 to 18.

The QTI-EP questionnaire makes a unique contribution that goes beyond the dyadic teacher-student relationship (e.g., Pianta, 2006) and takes into account the plural and ecological context of the classroom. The QTI-EP places the student in a position to report directly on the classroom environment, how the teacher treats the students as a group, the way he or she teaches and deals with disciplinary issues, and not how an individual student personally feels in the classroom as part of the dyadic relationship with that teacher. To date the two traditions have ignored each other. Personal relationships and social environment are two different, but related, aspects. Mora (2012) found that the two aspects predict each other, but that the predictive capacity of interpersonal dimensions *(proximity, control)* on dyadic relationships (in terms of warmth, closeness and conflict) is much greater than the other way round, therefore justifying universal interventions as opposed to interventions focused on specific children.

The findings support the interpersonal theory proposed by Wubbels et al. (1985). The presence of the two dimensions, *proximity*

and *control,* each with a positive and a negative extreme, are also confirmed for these age groups. The positive extreme of the *proximity* dimension reflects kind and friendly treatment while the negative reflects expressions of dissatisfaction by the teacher (s/he complains, shouts at us, etc.). Clarity, attention and coherence on the part of the teacher appear at the positive extreme of the *control* dimension, while the negative extreme reflects absence of control or improperly applied control causing students to disobey, not pay attention, answer back and talk out of turn. Thus, a unique interpersonal climate builds up in each classroom as a result of the multiple interactions between the teacher and the whole group of students (Kokkinos et al., 2009).

Furthermore, in contrast to the case of older pupils, the two dimensions are positively and moderately correlated in these age groups (Zijlstra, Wubbels, & Brekelmans, 2010). Thus, teachers' affective and supportive behaviors affect their behaviors in structuring learning and vice versa. As Brock, Nishida, Chiong, Grimm and Rimm-Kaufman (2008) point out, whether or not children make an effort, complete their school work and achieve good achievements depends in part on their perception of the quality of the *proximity* interactions and the *control* interactions that their teacher has with the class. Vaquer et al. (2011) refer to this when they state that the two components involved in the teacher's educational orientation, *affective support* and *guidance,* must necessarily operate in an integrated way.

Taken together, these results support Murray et al.'s (2008) claim that there is sufficient evidence that children in the first and second grades of primary school can report appropriately on the types of support they receive, and that these constructs are related to school adjustment. The children in this study were able to provide reliable information on both the levels of *proximity* their teacher-tutor offers the group, and his or her degree of *control* in the classroom; significant agreement on the teacher's interpersonal treatment with the students was observed among children in the same class. The results also reveal that, although students in this age group tend to perceive high levels of teacher *proximity* and *control*, their classroom perceptions differ from those of students from other classes, thus demonstrating that the QTI is able to differentiate between classrooms in terms of proximity and in control.

A significant factor when studying students' perceptions of the climate of relationships with teachers is the ability to predict achievement. The results confirm some of Zijlstra et al.'s (2013) findings, since only *proximity* behaviors predict academic achievement. Hence, for students in this age group the

teacher's level of *proximity* is crucial, supporting the conclusion drawn in Cornelius-White's (2007) meta-analysis that affective variables are the ones that are most strongly associated with student outcomes. On the other hand, although the *control* dimension did not prove to be a predictor of academic achievement, it was found to have a moderating effect on the predictive capacity of the *proximity* dimension for the combined mark. Overall the results indicate, first, that marks improve as *proximity* increases, and second, as more *control* is perceived, the intensity of the *proximity* effect on marks declines. Excessive efforts to influence or structure do not improve the positive relationship between *proximity* and marks. Taking *proximity* levels as a reference, it is seen that: a) with high levels of *proximity,* the best results occur with low and medium levels of *control*; b) with medium levels of *proximity*, the teacher's level of *control* does not make any difference; and c) with low levels of *proximity*, high/medium levels of structure are preferred to offset this lack of affective support. It therefore seems advisable —and this can be considered a practical implication of the present research— for teachers to focus their efforts on understanding and establishing friendly, supportive relationships with their students, as well as self-regulating their efforts to control or influence the class, by promoting levels of autonomy and cooperation among their students. Only in environments with poor levels of *proximity* behaviors does high/medium structuring appear to yield better results.

Although the QTI-EP opens up some promising possibilities, certain limitations of the study should be noted. Two items, 3 and 5, were not included in the factor structure because they provide little variance to the *proximity* construct. Both refer to how the teacher behaves when children make mistakes. It would be helpful to find out what children understand by the concept of "mistakes" or to use alternative expressions such as "gets angry when we do something wrong" or "gets angry if we don't get something right". Similarly, in light of the results, it would be of interest to extend the number of classes that authorize the use of school marks in research studies, thus allowing multilevel research to be conducted, and improving analysis of the differences in achievement among classrooms, in other words, among teachers' interpersonal teaching styles. Similarly, the differences detected between the present study and that of Zijlstra et al. (2013), as well as those we identified according to whether mathematics marks or combined marks are used, point to the need for continued attention to the effect of different performance measures (tests, assessments, marks), and the specific type of measure used

(mathematics mark, overall mark). Future research should also continue to analyze the effect of the interaction between the interpersonal dimensions, a core issue in the interpersonal theory proposed.

In light of the results, we also consider that the QTI-EP can be used not only to evaluate environments, but as a guide to improve relationships and help teachers to design intervention strategies as part of their professional development (Nijveldt, Beijaard, Verloop, Brekelmans, & Wubbels, 2005), which may be regarded as a positive contribution of this study. Finally it may be considered that modifying the teacher's emotional and educational interactions with students can affect children's school careers. By considering teachers as reflective professionals (Spilt, 2010), the QTI would: a) help them analyze the differences between children's perceptions and their own perceptions; b) instruct them on general principles of interpersonal behavior in which emotional supportive behaviors *(proximity)* and instructional support *(control)* must always be present; and c) suggest, based on the QTI items, a repertoire of behaviors to promote or minimize issues that can certainly contribute to improving teaching quality. The QTI would thus become a resource for promoting motivational teaching skills, which according to Carbonero, Román, Martín-Antón, and Reoyo (2009), is an essential question to address students' involvement in learning tasks.

References

Amelsvoort, J. van (1999). *Perspective on instruction, motivation and self-regulation.* [In Dutch] Unpublished Doctoral Dissertation. Nijmegen: Katholieke Universiteit Nijmegen.

Bentler, P. M. (1995). *EQS structural equations program manual*. Encino, CA: Multivariate Software.

Brekelmans, M., Sleegers, P., & Fraser, B. (2000). Teaching for active learning. In R. J. Simon, J. van der Linden & T. Duffy (coords.), *New learning* (pp. 227-241). Dordrecht, The Netherlands: Kluwer Academic Publishers.

Brock, L. L. den, Nishida, T. K., Chiong, C., Grimm, K. J., & Rimm-Kaufman, S. E. (2008). Children's perceptions of the classroom environment and social and academic performance: A longitudinal analysis of the contribution of the responsive teacher approach. *Journal of School Psychology, 46,* 129-149. doi: 10.1016/j.jsp.2007.02.004

Brok, P. den, Brekelmans, M., & Wubbels, T. (2004). Interpersonal teacher behavior and student outcomes. *School Effectiveness and School Improvement, 15*(3-4), 407-442. doi: 10.1080/09243450512331383262

Brok, P. den, Fisher, D., Brekelmans, M., Rickards, T., Wubbels, T., Levy, J., & Waldrip, B. (2003, April). *Students' perceptions of secondary teachers' interpersonal style in six countries: a study on the validity of the Questionnaire on Teacher Interaction*. Paper presented at the annual meeting of the American Educational Research Association, Chicago. ERIC document: ED475164.

Buyse, E., Verschueren, K., Doumen, S., Van Damme, J., & Maes, F. (2008). Classroom problem behavior and teacher-child relationships in kindergarten: The moderating role of classroom climate. *Journal of School Psychology, 46*, 367-391. doi: 10.1016/j.jsp.2007.06.009

Carbonero, M.A., Román, J. M.ª, Martín-Antón, L. J., & Reoyo, N. (2009). Efecto del programa de habilidades docentes motivadoras en el profesorado de secundaria. *Revista de Psicodidáctica, 14*(2), 229-243.

Cornelius-White, J. (2007). Learner-centered teacher-student relationships are effective: A meta-analysis. *Review of Educational Research*, *77*, 113-143. doi: 10.3102/003465430298563

Crosnoe, R., Morrison, F., Burchinal, M., Pianta, R. C., Keating, D., Friedman, S. L., & Clarke-Stewart, K. A. (2010). Instruction, teacher-student relations, and math achievement trajectories in primary school. *Journal of Educational Psychology*, *102*(2), 407-417. doi:10.1037/a0017762

Doyle, W. (1986). Classroom organization and management. In M. C. Wittrock (Ed.), *AERA Handbook of research on teaching*, 3rd. ed. (pp. 392-431). New York: Macmillan.

Fraser, B. J., Aldridge, J. M., & Soerjaningsih, W. (2010). Instructor-student interpersonal interaction and student outcomes at the university level in Indonesia. *The Open Education Journal, 3,* 32-44.

Fraser, B. J., & Walberg, H. J. (2005). Research on teacher-student relationships and learning environments: Context, retrospect and prospect. *International Journal of Educational Research, 43*, 103-109. doi: 10.1016/j.ijer.2006.03.001

Goh, S. C., & Fraser, B. J. (1998). Teacher interpersonal behaviour, classroom environment and student outcomes in primary mathematics in Singapore. *Learning Environments Research, 1*, 199-229. doi: 10.1023/A:1009910017400

Goh, S. C., & Fraser, B. J. (2000). Teacher interpersonal teacher behaviour and elementary students' outcomes. *Journal of Research in Childhood Education, 14*, 216-231. doi:10.1080/02568540009594765

Henderson, D. G. (1995). *A study of the classroom and laboratory environments and student attitude and achievement in senior Secondary Biology classes*. Unpublished doctoral dissertation. Perth: Curtin University of Technology.

Holmbeck, G. N. (2002). Post-hoc probing of significant moderational and mediational effects in studies of pediatric populations. *Journal of Pediatric Psychology, 27,* 87-96. doi: 10.1093/jpepsy/27.1.87

Jose, P. E. (2013). *ModGraph-I: A programme to compute cell means for the graphical display of moderational analyses: The internet version, Version 3.0*. Victoria University of Wellington, Wellington, New Zealand. Retrieved [22-03-2012] from http://pavlov.psyc.vuw.ac.nz/paul-jose/modgraph/

Kline, R. (2005). *Principles and practice of structural equation modelling*. 2nd ed. New York: Guilford Press.

Kokkinos, C. M., Charalambous, K., & Davazoglou, A. (2009). Interpersonal teacher behaviour in primary school classrooms: A cross-cultural validation of a Greek translation of the Questionnaire on Teacher Interaction. *Learning Environments Research, 12,* 101-114. doi: 10.1007/s10984-009-9056-9

Kyriakides, L., & Creemers, B. P. M. (2008). Using a multidimensional approach to measure the impact of classroom level factors upon student achievement: a study testing the validity of the dynamic model. *School Effectiveness and School Improvement, 19(2*), 183-205. doi: 10.1080/09243450802047873

Leary, T. (1957). *An interpersonal diagnosis of personality*. New York: Ronald.

Lebreton, J. M., & Senter, J. L. (2008). Answers to 20 Questions About Interrater Reliability and Interrater Agreement. *Organizational Research Methods*. *11*(4), 815-852. doi: 10.1177/1094428106296642

Liew, J., Chen, Q., & Hughes, J. N. (2009). Child effortful control, teacher-student relationships, and achievement in academically at-risk children: Additive and interactive effects. *Early Childhood Research Quarterly, 23*, 51-64. doi: 10.1016/j.ecresq.2009.07.005

Lüdtke, O., Robitzsch, A., Trautwein, U., & Kunter, M. (2009). Assessing the impact of learning environments: How to use student ratings of classroom or school characteristics in multilevel modeling. *Contemporary Educational Psychology 34,* 120-131. doi:10.1016/j.cedpsych.2008.12.001

Maulana, R., Opdenakker, M-Ch., den Brok, P., & Bosker, R. (2011) Teacher-student interpersonal relationships in Indonesia: profiles and importance to student motivation, *Asia Pacific Journal of Education, 31*(01), 33-49. doi: 10.1080/02188791.2011.544061

Mora, I. G. (2012). *El clima de aula y las relaciones profesor-alumno en las aulas de primer ciclo de educación primaria*. Trabajo Fin de Máster. Castellón: Universitat Jaume I.

Murray, C., Murray, K. M., & Waas, G. A. (2008). Child and teacher reports of teacher-student relationships: Concordance of perspectives and associations with school adjustment in urban kindergarten classrooms. *Journal of Applied Developmental Psychology, 29,* 49-61.

Nijveldt, M., Beijaard, D., Verloop, N., Brekelmans, M., & Wubbels, T. (2005). Assessment of beginning teachers' interpersonal competence: The quality of assessors' judgement processes. *International Journal of Educational Research*, 43, 89-102. doi: 10.1016/j.ijer.2006.03.008

Pianta, R. (2006). Classroom management and relationships between children and teachers: Implications for research and practice. In C. Evertson & C. Weinstein (Eds.), *Handbook of classroom management: re-*

search, practice, and contemporary issues (pp. 685-710). Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Pianta, R. C., Hamre, B., & Stuhlman, M. W. (2003). Relationships between teachers and children. In W. Reynolds and G. Miller (Eds.), *Comprehensive handbook of psychology Vol. 7*, Educational psychology (pp. 199-234). Hoboken, NJ: Wiley.

Rawnsley, D. G. (1997). *Associations between classroom learning environments, teacher interpersonal behaviour and student outcomes in Secondary Mathematics classrooms*. Unpublished doctoral dissertation. Perth: Curtin University of Technology.

Roorda, D. L., Koomen, H., Spilt, J. T., & Oort, F. J. (2011). The influence of affective teacher-student relationships on students' school engagement and achievement: A meta-analytic approach. *Review of Educational Research, 8*(4), 493-529. doi: 10.3102/0034654311421793

Sivan, A., & Chan, D. W. K. (2013). Teacher interpersonal behaviour and secondary students' cognitive, affective and moral outcomes in Hong Kong. *Learning Environment Research, 16,* 23-36. doi: 10.1007/s10984-012-9123-5

Skinner, E. A., Wellborn, J. G., & Connell, J. P. (1990). What it takes to do well in school and whether I've got it: A process model of perceived control and children's engagement and achievement in school. *Journal of Educational Psychology, 82*, 22-32. doi: 10.1037/0022-0663.82.1.22

Spilt, J. L. (2010). *Relationships between teachers and disruptive children in kindergarten: An exploration of different methods and perspectives, and the possibility of change*. Dissertation. Amsterdam. SCO-Kohnstamm Instituut.

Valiente, C., Lemerey-Chalfant, K., Swanson, J., & Reiser, M. (2008). Prediction of children's academic competence from their effortful control, relationships, and classroom participation. *Journal of Educational Psychology, 100*(1), 67-77. doi: 10.1037/0022-0663.100.1.67

Vaquer, A., Carrero, V., & García Bacete, F. (2011). Encuentro y vinculación afectiva: pilotaje y proceso de nutrición relacional en educación. *Psychosocial Intervention, 20*(2), 213-225. doi: 10.5093/in-2011v20n2a9

Watzlawick, P., Beavin, J. H., & Jackson, D. (1967). *The pragmatics of human communication*. New York: Norton.

Wubbels T., & Brekelmans, M. (2005). Two decades of research on teacher-student relationships in class. *International Journal of Educational Research, 43*, 6-24. doi: 10.1016/j.ijer.2006.03.003

Wubbels, T., Brekelmans, M., & Hooymayers, H. P. (1991). Interpersonal teacher behaviour in the classroom. In B. J. Fraser & H. J. Walberg (Eds.), *Educational environments and effects: Evaluation, antecedents and consequences* (pp. 141-160). London, UK: Pergamon Press.

Wubbels, T., Brekelmans, M., Brok, P. den, & Tartwijk, J. van (2006). An interpersonal perspective on classroom management in secondary classrooms in the netherlands. In C. Evertson & C. Weinstein (Eds.), *Handbook of classroom management: research, practice and contemporary issues* (pp. 1161-1191). New York: Erlbaum.

Wubbels, T., Créton, H. A, & Hooymayers, H. P. (1985). *Discipline problems of beginning teachers, interactional behavior mapped out*. Paper presented at the American Educational Research Association Annual Meeting, Chicago.

Zijlstra, A., Wubbels, T., & Brekelmans, M. (2010). *Child perceptions of the Child-Teacher Relationship and Mathematical Achievement: An Interpersonal Perspective on Teaching Early Grade Classrooms*. Paper presented in International Conference on Interpersonal Relationships in Education (ICIRE), in Boulder, Colorado (USA), April 28-29.

Zijlstra, A., Wubbels, T., Brekelmans, M., & Koomen, H. (2013). Child perceptions of teacher interpersonal behavior and associations with mathematics achievement in Dutch early grade classrooms. *The Elementary School Journal, 113*, 4. *(Preview published on line 23rd April 2013)*. doi: 10.1086/669618

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